Original Article

The Prevalence of Syphilis Among Blood Donors in a Centralized Nigerian Blood Transfusion Service Centre

Damulak OD[1], Jatau E[1], Akinga E[2], Peter G[2]

[1]Department of Haematology and Blood Transfusion, Jos University Teaching Hospital, Jos
[2]National Blood Transfusion Service, North Central Zonal Centre, Jos. Nigeria

ABSTRACT

BACKGROUND: Syphilis is one of the mandatory transfusion transmissible infections to be tested for in any unit of blood for homologous transfusion. The paucity of voluntary blood donors in Nigeria has compelled health care providers to rely on paid and family replacement donors for blood.

AIMS: This study was carried out to determine the prevalence of syphilis among blood donors at a centralized Transfusion Service in North Central Nigeria.

METHOD: Records of blood donors at the North Central Zonal Centre of the National Blood Transfusion Service in Jos, from April 2007 to March 2010 were analyzed for sero-positivity to Treponema pallidum and co-infections with other transfusion transmissible infections.

RESULTS: 9,500 blood donors where received at the Transfusion Service Centre in Jos within the study period. The overall prevalence of syphilis among blood donors was 0.9%. New voluntary non remunerated donors constituted 69.9% with a syphilis sero-positivity of 0.9% and 0.2% co-infection. Retained voluntary non remunerated donors accounted for 19.5% with syphilis sero-positivity of 0.2%. Family replacement donors made up 10.6% of total blood units screened with a 2.0% anti-syphilis positive reaction and 1.0% co-infection.

CONCLUSION: The prevalence of syphilis among blood donors in a centralized transfusion service may be low.

KEY WORDS: prevalence of syphilis, blood donor retention, transfusion service.

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INTRODUCTION

Blood transfusion, an integral part of effective medical delivery, is encumbered by the prevalent presence of transfusion transmissible infections (TTIs), paucity of voluntary blood donors and poor retention strategy of safe blood donors. Poor facilities for centralized transfusion service in Africa in general and Nigeria in particular, leaves the health system of such Nations with the option of blood sourcing from commercial and family replacement donors who are likely to conceal donor disqualifying informations.[1]

The World Health Organization (WHO) demands safe blood transfusion practice in each member country, through centralized transfusion service where blood are voluntarily donated, tested for the mandatory TTIs using Enzyme Linked Immuno-sorbent Assay (ELISA) as minimum required screening standard and process to meet appropriate clinical usages.[1,2]

Syphilis, one of the mandatory TTIs to be tested for in any blood unit for possible transfusion is caused by Treponema pallidum, first isolated in 1905.[2,3,4]

Infection with this agent is acquired horizontally through sexual routes and transfusion of infected fresh human blood or vertically from mother to child.[4] Untreated infection is usually progressive with a period of latency, when infected persons only show serological evidence.[4,5,6]

Reports from researchers showed varied prevalence of syphilis among blood donors. A Georgian study in 2001 reported a 2.3% prevalence of syphilis among its blood donors.[7]

A study in North Western Ethopia recorded a prevalence of 1.2% syphilis among their blood donors. Syphilis and other blood borne pathogens were found in 56.6% of commercial and 53.6% of family replacement donors compared to 17.6% among voluntary blood donors.[8]

Umeke reported a 2.0% syphilis sero-positivity in HIV negative and 14.0% among HIV positive Nigerians. He also noticed a higher syphilis infection rate among female compared to their male counterparts with 15.0% and 2.1% in HIV positive and negative females respectively, and a 12.7% in HIV positive and 1.9% among HIV negative males.[9]

Osime, working in the oil rich region of southern Nigeria, recorded a 16.0% and 3.4% sero-positivity to syphilis among female and male blood donors respectively.[10]

In south western Nigeria, a prevalence of 2.0% syphilis sero-positivity was recorded among pregnant women, advocating continual screening of all women in pregnancy for this agent.[11]

Correspondence: Damulak Obadiah Dapus

Olokoba, while studying syphilis among voluntary blood donors in North Eastern Nigeria observed predominant male donors with a 1.7% syphilis sero-positivity. He also found no syphilis infection among his few female blood donors.[12]

In Northern Nigeria, Nwokedi and colleagues reported a prevelence of 2.9% syphilis sero-positive reaction among antenatal clients in a tertiary hospital. They found the highest prevelence of 3.2% among subjects in the age bracket of 21-30 years.[13]

Data on syphilis among voluntary donors found in centralized transfusion service like ours is either scanty or undocumented as is the case in this centre. We undertook this study to determine the prevalence of this blood transmissible infection and to make transfusion safety recommendations.

MATERIALS AND METHOD

Records of 9500 blood donors received at the north central zonal centre of the National Blood Transfusion Service, Jos, from April 2007 to March 2010 were reviewed in retrospect for antibody reactivity to Treponema pallidum. Records of age, sex, type of blood donation were also scrutinized. Blood donors who reacted to syphilis antibody test were further reviewed for co-infection with other TTIs. The screening methods used for detecting TTIs were also reviewed. Results are presented in tables. Chi Square and Fisher's Exact tests were applied for statistical analysis.

RESULTS

Nine thousand five hundred donor records reviewed within the period under study showed the age bracket of all donors being within 18-65 years with a higher population of male (61.4%) to (38.6%) female blood donors except family replacement (1003) donors, whose age and sex records were not documented. Donors were new voluntary non-remunerated (69.9%), retained voluntary non-remunerated (19.5%) and family replacement (10.6%). TTIs status were determined by antigen antibody HIV ELISA screening test (GENSCREEN ULTRA HIV Ag-Ab), hepatitis B surface antigen (HBsAg) ELISA test (MONOLISA HBsAg ULTRA), hepatitis C virus antibody ELISA test (DIA.PRO) and ELISA Treponema palladium test (DIA.PRO).

A total of 85 (0.9%) of all blood donors studied were reactive to syphilis. Sixty five (0.8%) of all the voluntary non-remunerated donors, mean age 30.4 years, were reactive to Treponema palidum. The age distribution of syphilis sero-positive voluntary blood donors was highest within 36-45 and lowest in 46-65 year age brackets. Table 1.

TABLE 1

Age range (years)	Number sero-positive (%)
18-25	14 (21.5)
26-35	16 (24.6)
36-45	23 (35.4)
46-55	8 (12.3)
56-66	4 (6.2)
Total	**65 (100.0)**

Age Distribution of Syphilis Sero positive Voluntary Blood Donors.

Voluntary non-remunerated blood donors contributed 65 (76.5%) anti syphilis positivity. There were 50 (76.9%) and 15 (23.1%) sero-positive males and females with a sex prevalence of 0.8% and 0.5% respectively. Family replacement donors accounted for 23.5% syphilis sero-positivity. Two percent of family replacement donors, 0.9% new voluntary non-remunerated and 0.2% of retained voluntary non-remunerated blood donors were positive. All syphilis antibody positive retained voluntary non-remunerated blood donors were males. Table 2

Table 2

Type of blood donors	Number of Donors	Number Sero-positive For syphilis	Numberpositive for syphilis & Other TTIs
New VNRBD	6641 (69.9%)	62 (0.9%)	10 (0.2%)
Retained VNRBD	1856 (19.5%)	3 (0.2%)	0 (0.0%)
FRBD	1003 (10.6%)	20 (2.0%)	9 (1.0%)

Distribution of Syphilis Sero-positivity Among Blood Donor Types.

Key.

VNRBD: Voluntary Non Remunerated Blood Donors

FRBD: Family Replacement Blood Donors

TTIs: Transfusion Transmissible Infections

A comparative analysis showed that the prevelence of syphilis sero-positivity was significantly higher among Family Replacement Blood Donors (FRBD) compared to New Voluntary Non Remunerated Blood Donors (VNRBD); P=0.002 and much higher than among Retained VNRBD; P=0.0000002. The prevelence of syphilis reactivity was however higher among New VNRBD compared to Retained VNRBD; P=0.0007. Table 3

Table 3

	Number Negative	Number Positive	P value
FRBD & New VNRBD	983 (98.0%) 6579 (99.1%)	20 (2.0%) 62 (0.9%)	0.002
FRBD & Retained VNRBD	983 (98.0%) 1853 (99.8%)	20 (2.0%) (0.2%) 3	0.0000002
New VNRBD & Retained VNRBD	6579 (99.1%) 1853 (99.8%)	62 (0.9%) 3 (0.2%)	0.0007

Comparism of syphilis sero positivity among blood donor types

Key.

VNRBD: Voluntary Non Remunerated Blood Donors

FRBD: Family Replacement Blood Donors

When analyzed for co-infections, 0.2% of voluntary non-remunerated blood donors and 1.0% family replacement blood donors had one or more other TTIs along with syphilis. The prevalence of co infections among VNRBD were; syphilis and hepatitis B (0.05%), syphilis and hepatitis C (0.05%), syphilis and HIV (0.02%), syphilis, hepatitis C and B (0.02%) and syphilis, hepatitis B and HIV (0.01). These co-infections among FRBD were 0.2%, 0.1%, 0.3%, 0.0% and 0.3% respectively. There were no co-infections among retained voluntary non-remunerated blood donors. Table 4

Table 4

Type of donor	Syphilis &HBV	Syphilis &HCV	Syphilis &HIV	Syphilis &HBV/HCV	Syphilis &HBV/HIV
New VNRBD	(0.04 6%)	4 (0.06%)	2 (0.03%)	2 (0.03%)	1 (0.01%)
FRBD	2 (0.2%)	1 (0.1%)	3 (0.3%)	0 (0.0%)	3 (0.3%)

Distribution of Syphilis Sero-positivity with Co-infections Among Various Donor Types.

Key.

VNRBD: Voluntary Non Remunerated Blood Donors
FRBD: Family Replacement Blood Donors
HBV: Hepatitis B Virus
HCV: Hepatitis C Virus
HIV: Human Immunodeficiency Virus

The rates of co-infection with HBV and HCV were higher among FRBD compared to new VNRBD. These differences were not significant; P=0.2 and 0.5 respectively. The rate of co-infection with HIV was however significantly higher among FRBD than new VNRBD; P=0.02. Multiple co-infections with HBV and HCV was not significantly different between FRBD and new VNRBD; P=1.0 while multiple co-infections with HBV and HIV was significantly higher (P=0.008) among FRBD than new VNRBD. Table 5.

Table 5

	Syphilis &HBV	P	Syphilis &HCV	P	Syphilis &HIV	P	Syphilis & HBV/HCV	P	Syphilis, HBV &HIV	P
FRBD	2 (0.2%)		1 (0.1%)		3 (0.3%)		0 (0.0%)		3 (0.3%)	
		0.2		0.5		0.02		1.0		0.008
New VNRBD	4 (0.06%)		4 (0.06%)		2 (0.03%)		2 (0.03%)		1 (0.02%)	

Comparism of syphilis and co-infections between FRBD and New VNRBD

Key.

VNRBD: Voluntary Non Remunerated Blood Donors
FRBD: Family Replacement Blood Donors
HBV: Hepatitis B Virus
HCV: Hepatitis C Virus
HIV: Human Immunodeficiency Virus

DISCUSSION

Homologous blood transfusion is bedeviled by cases of transfusion transmissible infections (TTIs). Long term complications of blood transfusion include contraction of one or more agents of TTIs such as syphilis. Voluntary blood donation in this study is 89.4% (new and retained voluntary blood donors) with only 10.6% of blood coming from hospitals through family replacement donation. In our study, more males (61.4%) donated blood than females (38.6%) with a ratio of 3:2. This show a clear increase in the female recruitment and donation in voluntary blood donations as earlier report showed a low female enrolment in similar mode of blood donation.[12] The overall prevalence of syphilis sero-positivity among blood donors in our study is 0.9%. This lower value compared to most previous reports, may be due to self exclusion of potential donors with risk exposure to TTIs as is the recommendation in voluntary blood donation. The prevalence of 0.9% in our study is still lower significantly than the findings of Olokoba etal who reported 1.7% among voluntary donors in their study.[12] This difference may be due to the application of self risk exposure to TTIs assessment and exclusion from blood donation in our prospective donors. The prevalence of syphilis was 0.8% among male and 0.5% among female blood donors. These values differ from report by Umeke who found higher prevalence of syphilis in HIV negative Nigerian females compared to their male counterpart and also at variance with the report of Osime who recorded higher prevalence of syphilis among female blood donors.[9,10] The paucity of viable income sources, like the multinational oil companies, in North Central Nigeria may explain this trend as commercialization of sex and exposure to syphilis and other sexually transmitted diseases may be income dependent. The prevelence of syphilis among our donors is still lower than the 2.9% documented by Nwokedi in Kano Nigeria which may be due to their smaller sample size that are entirely sexually active with no opportunity of self exclusion.[13] The prevalence of syphilis among the three donor groups in our study are all higher than it is reported among all Indian blood donors, suggesting the need to improved on transfusion safety in Nigeria through diligent application of donor selection criteria. [14] Age distribution of syphilis sero-positivity showed that 21.5% were within the age bracket of 18-25years, 24.6% within 26-35years, the highest percentage of 35.4% were within 36-45years. A lower percentage of 12.3% fall in the 46-55years age bracket and only 6.2% were within 56-65 years. This may suggest that donors aged above 45 years rather than 18-25 years are at lower risk of haematogenous transmission of syphilis, highlighting the need for safe lifestyle advocacy among young blood donors to increase and sustain safe donor pool. Sero-positivity found in our study was highest among family replacement donors with a prevalence of 2.0%, 0.9% among first time or new VNRBD and 0.2% among retained VNRBD. Two percent prevalence of syphilis sero-positivity among our family replacement donors is similar to reports from Georgia and North Western Ethopia.[8,9] This finding is also similar to that of Umeke who reported a prevalence of 2.0% among HIV negative Nigerians.[10-12] The prevalence of 0.8% among new VNRBD and 0.2% among retained VNRBD are however lower than earlier reports.[9-12] The prevalence of 0.2% syphilis infection among our retained donors suggests an increased transfusion safety derivable from informed retention of safe blood donors.[6] This is further supported by the

significant statistically lower syphilis positivity rate between new VNRBD and FRBD (P=0.002), retained VNRBD and FRBD (P=0.0000002) and among retained VNRBD compared to new VNRBD

The overall prevalence of syphilis with other TTIs co-infection is this study is higher among family replacement (0.9%) compared to 0.3% among new VNRBD (table 3). The significant association of syphilis and HIV with or without HBV sero-reactivity suggests a higher predisposition to transmission of multiple TTIs, particularly when blood sourcing for patients is through family replacement. The screening of all blood units for syphilis may exclude non reacting HIV recently contaminated units. The need to develop strategy for safe donor retention is further highlighted by the absence of co-infections in our retained blood donors.

CONCLUSION

The prevalence of syphilis though low in this study, is still a significant transfusion problem in family replacement blood donation. The risk of acquiring syphilis through the transfusion of blood received from voluntary blood donors is lower, more so when such donors are retained. It is further concluded that family replacement blood donation may be associated with multiple transfusion acquired infections in higher proportion to VNRBD.

We recommend the sourcing of blood for homologous transfusion from voluntary non remunerated blood donors while efforts are made at retaining blood donors found free of syphilis and other TTIs. We recommend further, the provision of clinical services at the transfusion service to treat donors whose blood is sero-positive to syphilis alone, and readmit such into donor pool after counseling if they become and remain sero-negative to syphilis and other TTIs. Donors whose blood is positive to syphilis and other TTIs should not be allowed to donate but be converted into change agents and blood donor recruiters.

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